भारतीय मानक

Indian Standard

IS 15475 (Part 2) : 2022

मनोरंजन के लिए सुरक्षित सवारी की संस्तुत रीति संहिता

भाग 2 सुरक्षा अपेक्षाएं

(पहला पुनरीक्षण)

Code of Recommended Practice for Amusement Rides Safety

Part 2 Safety Requirements

(First Revision)

ICS 97.200.40

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September 2022 **Price Group 6**

Continuous Bulk Conveying, Elevating, Hoisting Aerial Ropeways and Related Equipment Sectional Committee, MED 6

FOREWORD

This Indian Standard (Part 2) was adopted by the Bureau of Indian Standards, after the draft finalized by the Continuous Bulk Conveying, Elevating, Hoisting, Aerial Ropeways and Related Equipment Sectional Committee had been approved by the Mechanical Engineering Division Council.

Amusement parks in India are becoming quite common and people visit these parks quite often. In order to ensure their safety in amusement parks or while enjoying the rides, an attempt has been made to stipulate safety in the form of a National Code. It is hoped that organizers of amusement parks, manufacturers of rides would make use of these codes to ensure the overall safety of human beings and equipment at such places.

This revision has been taken up to keep pace with the latest technological developments and international practices. This revision incorporates the following major changes :

a) More safety provisions were added with the inclusion of new clauses **5**,**6**,**7**.

The code of recommended practice for amusement rides safety is in six parts.This standard covers the safety requirements relating to amusement rides safety. Other parts in this series under the general title are as follows :

Part 1	General information
Part 3	Design, manufacture, and erection
Part 4	Selection, training, and supervision of operators
Part 5	Operation and maintenance procedures
Part 6	Performance tests

The composition of the committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values’ (*second revision*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CODE OF RECOMMENDED PRACTICE FOR AMUSEMENT RIDES SAFETY

PART 2 SAFETY REQUIREMENTS

(*First Revision*)

1 SCOPE

This standard (Part 2) covers general safety requirements related to amusement ride or device to be taken care of during its construction, installation, utilization, and maintenance to ensure its uses to the optimum advantage, and to prevent, as far as possible, any accidents or mishaps that could arise from misuse.

These safety requirements shall be in addition to the requirements/information given in IS 15475 (Part 1).

This standard is not intended to contravene any provision of any of the existing Government regulations. It is the responsibility of the user of this code to establish appropriate safety and health practices and comply with regulatory and statutory requirements prior to the use of the ride or device for carrying a passenger for amusement.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 15475 (Part 1) : 2022	Code of recommended practice for amusement rides safety — Part 1 general information
IS 15475 (Part 3) : 2022	Code of recommended practice for amusement rides safety — Part 3 Design, manufacture, and erection
IS/IEC 60947 (Part 1) : 2007	Low-Voltage switchgear and controlgear — Part 1 general rules (*first revision*)

3 APPLICATION

These safety requirements apply in specified conditions as agreed by the user and manufacturer of an amusement ride or device keeping in view the safety of the operator, attendant, rider, and visitors.

3.1 Normal working conditions shall be specified and defined for standard equipment in the manufacturer's catalog in agreement with the user or the purchaser.

3.2 The safety requirements apply to ride or device excluding the structures (building framework, plants, etc) except when such structures have been designed so as to share any loads from the ride or have any direct physical connection with the ride or device.

3.3 Skilled personnel, such as fitters, welders, maintenance, and repair personnel who only work from time to time at the request of the user shall observe special requirements.

3.4 Persons whose duties do not demand their presence on the ride or in the vicinity of the equipment and devices, shall observe forbidding access to certain areas.

4 GENERAL REQUIREMENTS

The construction erection and operation of all equipment appliances used in amusement ride system shall meet the statutory, specific, and other requirements relating to safety in general and the following general requirements.

4.1 In the Construction Stage (Design and Manufacture)

4.1.1 *Design and Construction of Platform, Walkways, Stairways and Ladders*

The design of platforms, walkways, stairways, and ladders shall be such that adequate clearance is provided for normal operation, servicing, and maintenance giving sufficient room for freedom of movement and access for carrying out such duties.

4.1.2 The stability and strength of the ride or device (static and mobile) shall be ensured under all working conditions, including climatic conditions, as agreed by the interested parties.

4.1.3 The whole ride path and especially the entry, exit, and transfer points shall be designed so as to avoid falling, slipping of rider/passengers.

4.1.4 The support element of the passengers and load (belt, chairs, swing cabin, etc) shall have sufficient size suitable and comfortable to the passenger/rider.

4.1.5 In order to prevent overrunning or running backward of the ride, all inclined or vertical appliances shall include a safety device that operates whenever the motive power is cut-off or fails and where the passengers conveyed possess kinetic or potential energy.

4.1.6 Certain fixed or mobile appliances may include an articulated or mobile part in a vertical plane, actuated by a motor or manually in each case, there shall be a compulsory safety device for immobilizing such an articulated part in the event of a voluntary or accidental stoppage of the motive power even if the latter is manual.

4.1.6.1 The lowering and raising system shall be fitted with a safety device to prevent accidental lowering and lifting of the ride or device and to prevent kickback of any manually operated crank.

4.1.6.2 The device for lowering and raising the movable part shall be so located that there is no necessity for the operator to be under the ride for operating the device.

4.1.6.3 The movement shall be limited at the extreme positions, by stops capable of supporting the stress due to the load.

4.1.7 The in-running nips and pinch points of the conveying device (belts, chains belt pulleys, etc) and the movable parts (chains sprockets, spur gears couplings, etc) shall be protected.

4.1.8 When shearing and squeezing points or zone exist on the path of the conveying elements due to change in direction, or close approach of fixed joints, guards shall be provided.

4.1.9 All movable parts giving access through mechanical handling equipment shall be designed so that they cannot be opened whilst the riding apparatus is working and so that apparatus cannot be started while they are open.

4.1.10 The entry and exit gates of the cabin and housings shall be made in such a way that they prevent access to the moving components, otherwise suitable protection shall be provided.

4.1.11 Opening in enclosed appliances, which give access to moving parts, shall be guarded by covers that require a hand tool for removal or are locked or are interlocked with the drive to the equipment.

4.1.12 Access to inspection holes shall be easy.

4.1.13 All lubrication points used frequently shall be accessible without it being necessary to remove the guards.

4.1.14 The equipment and devices shall be so designed that cleaning is facilitated.

4.1.15 Wheels and rollers of traveling rides and of additional traveling equipment shall be guarded at points accessible to personnel under normal working conditions.

4.1.16 Whenever an operator remains on the traveling equipment a platform shall be provided and be so designed as to prevent any accidental contact with mobile components or any part of the fixed installation.

4.1.17 When mobile appliances or equipment travel alongside an unprotected gangway, warning devices shall be provided.

4.1.18 Sharp edges and comers shall be removed.

4.1.19 Projecting parts of the moving equipment shall be as small as possible.

4.1.20 Rail crossings, walkways, galleries, workplaces under the overhead ride shall be protected by means of suitable covering to prevent falling of the material/objects over such areas/personnel.

4.2 During Installation Stage (Layout, Erection, and Entry into Service)

4.2.1 All powered appliances, equipment, and devices shall carry the following indications permanently and legibly marked in a clearly visible place:

a) Name of the manufacturer or supplier, and
b) Year of manufacture and serial number.

4.2.2 Access for Operation, Servicing, and Maintenance a permanent or stable platform shall be provided for the purpose of operation, regular servicing repair, and maintenance. A clear access platform or floor space of at least 0.5 m width shall be provided for the maintenance of every driving mechanism. All service platforms of appliancesor cabins on which operating personnel may require to be stationed should remain horizontal.

4.2.3 Access between movable parts of the static appliances or passengers and fixed obstacles shall be prevented by guards when the free space is less than 0.5 m.

4.2.4 There shall be fixed access to the platform, floor, or similar construction located more than 1.50 m above ground level.

4.2.4.1 Platform at different levels shall be adequately and conveniently connected by stairways or where stairways are not practicable, by fixed ladders. It is recommended that ladders be avoided as a means of access and access shall be preferably either by sloping ramp with slates or by a staircase. The angle of staircases with the horizontal shall not exceed 60°.

4.2.4.2 In case a ladder has to be used, the width between the uprights shall be 0.35 m minimum. Portable ladders shall not be used at places where operation and regular servicing are being carried out.

4.2.5 All flooring of platforms and treads of staircases shall be selected to suit the individual installation and working conditions and shall have a non-slip surface.

4.2.6 Sharp edges and corners shall be avoided in the area normally accessible to personnel between the floor and height of 2m.

4.2.7 All authorized passageways shall be indicated in a clear manner.

4.2.8 *Ride Control*

Except where the conveying system is under the control of an operator, an electrical or mechanical device shall be provided to automatically stop the ride or device.

4.2.8.1 Sequence interlocks shall be provided so that no device can supply to another device that is not in operation or under maintenance.

4.2.9 All starting and stopping devices shall be clearly indicated and easily accessible and shall be in accordance with the requirements of IS/IEC 60947 (Part 1).

4.2.9.1 Instantaneously operating manual stop-lock devices shall be provided either continuously or at selected points along with the installation. Resetting of these devices shall be carried out by authorized personnel and only after the fault has been rectified.

4.2.10 When a ride or device extends out of sight of the control station operator, audible and/or visual signals shall be provided to instruct the operating staff.

4.2.11 It is recommended that all lubrication points be painted to a specified pattern.

4.2.12 Staircases, ladders, fencing, guards, etc shall be erected before the ride is put into service.

4.2.13 Principles of guarding fencing, guards shall be designed to prevent injury to persons and shall be provided at all dangerous parts of a ride.

4.2.13.1 Fencing, guards shall be planned in to design of the ride and ride system and shall neither be added as an afterthought nor do they provide a hazard. The guards shall not have to be removed for normal cleaning, lubrication, or belt and chain tension adjustments.

4.2.13.2 At points along the ride where riders may fall, suitable guards shall be provided.

4.3 During the Utilization Stage (Operation and Maintenance)

4.3.1 No amusement ride or device shall be used for duties other than those for which it is designed nor under conditions other than those stated in the contract between the concerned parties and booklets relating to installation operation and maintenance.

4.3.2 It shall be strictly forbidden to use the ride or device for conveying materials.

4.3.3 Equipment particularly its conveying element shall be kept in proper working condition as recommended by the manufacturer and shall be well maintained at all times.

4.3.3.1 All apparatus, devices, working stations, and passageways shall be kept clear and clean.

4.3.4 The inspection, adjustment, maintenance, and cleaning of moving parts (belts, pulleys, idlers, chains, sprockets, etc) shall be carried out regularly according to the manufacturer’s instructions.

4.3.5 No inspection hole shall be opened while the appliance is in operation.The inspection cover may be electrically interlocked to, either remain locked during operation or to give a warning hooter if opened during operation, where ever required

4.3.6 No one, except those so authorized shall operate or interfere with the normal working of the ride. All starting operations shall only be carried out by qualified and competent personnel only.

4.3.7 Normal and emergency stopping devices shall be made known to all personnel and be accessible.

4.3.8 All restarting operations on an equipment/appliance which has been inoperative because of an emergency or accidental stoppage shall be preceded by an inspection aiming at:

a) Determining the cause of the emergency or accidental stoppage, and
b) Rectification of fault.

4.3.9 It shall be strictly forbidden to crossover or under an appliance except at the points especially provided for the purpose.

4.3.10 All adjustments, whether mechanical or electrical shall be carried out by competent and authorized persons, particularly in the case of safety devices.

4.3.11 Repairs and removal of protective covers, enclosures, or panels shall only be carried out after stopping the equipment, and after all the starting devices of the ride control panel have been made inoperative, by a competent person.

4.3.11.1 Re-commissioning shall be carried only after the protective devices have been replaced and order received from the authorized responsible person.

4.3.12 It shall be forbidden to carry out any lubrication while an appliance is in operation, except in cases when the parts to be lubricated are so located or there are special devices that will permit their lubrication without danger.

4.3.13 A logbook shall be maintained for each appliance and/or for each installation. Logbooks may be maintained in the form of electronic data if backup systems have been provided for safety.

4.3.14 In order to follow the instructions as recommended by the manufacturer or supplier regarding operation and maintenance of amusement ride system, suitable training shall be given to personnel operator/technician both operating and carrying out maintenance, as, in the long run, this may serve as the best way of accident prevention.

4.3.15 The users shall not make any alterations that affect the design, construction, installation, operating requirements of the ride or device without the consent of the manufacturer/constructor, as some of the alterations may give rise to detrimental consequences.

4.3.16 In case of emergency, when work has to be carried out on unfenced machinery in motion, another person(s) well acquainted with the actions to be taken shall be deputed to keep watch on the person at work and hold himself close to and ready to operate a stop device.

4.3.17 The manufacturer/designer shall identify the controls which require additional safety device when first safety device fails. Second/alternate safety shall be provided as fail-safe devices and shall be clearly indicated.

5 GENERAL SAFETY PROVISIONS

The controller shall identify all emergency situations (including those identified by the designer/manufacturer) which may arise during the operation and plan procedures to cover these situations. Such situations may include but are not limited to the following:

a) Ride breakdown;
b) Severe weather conditions;
c) Explosion;
d) Fire;
e) Power failure etc.

The controller shall cover the potential risks associated with the device in emergency situations. Some of them are given as under :

5.1 Evacuation and Escape

Exits and exit routes shall be clearly indicated by notices and directional signs, which are self-illuminating if required. In enclosed structures, the emergency lighting shall adequately illuminate exit routes, staircases, changes in level, and signs. Where necessary in the event of power failure, effective emergency lighting shall form part of the arrangements for the safe evacuation of persons from passenger-carrying devices.

While any person is within the structure, the doors of the structure and of any room within the structure which afford a means of exit shall not be locked or fastened in such a manner that they cannot be easily and immediately opened from the inside. All doors on an exit route shall open outwards so that people can escape in an emergency without impediment. Where exit doors have to be secured against outside intruders, there shall be a security guard placed always or wherever necessary.

Public address system may be introduced for Dark ride, Ropeway, and any other ride with a long track.

6 OTHER SAFETY REQUIREMENTS

a) Safety instructions should be clearly posted at the entrance to the ride and the amusement ride operators/attendants should strictly enforce all of them;

b) Separate brakes shall be provided in the drive of individual rides. Normal and emergency stopping devices shall be made known to all personnel and be accessible. The brakes must come into operation automatically when:
    1) Normal Stop/Emergency Stop push button is pressed;
    2) The ride speed exceeds 5% of the set speed;
    3) The tripping of Drive motor due to actuation control security devices;
    4) In case of power failure, as required.

c) Standby prime mover is required to run ride at slow speed, to rescue passengers from the system in case of failure of main motor or power failure or DG set failure;

d) Emergency pushbuttons must be provided at all comfortable locationsnear the ride operator for gradual stopping of the system;

e) Strictly maintaining maximum carrying capacity in terms of Adult & Child passengers (child age can be between 5-12 years);

f) Maintaining minimum height of the passengers (can be considered between 3 feet to 4 feet). This may vary from ride to ride or as per ride operational manual;

g) Introduce engineering control measures to prevent the following situations from occurring to a slim rider, who is at or marginally above the minimum height allowed to go on the ride. Consider if the rider is able to:
    1) Maneuver into a position (e.g. both legs onto the seat) where they could be ejected from the ride;
    2) Slip under the restraint system and into the footwell of the car where they could be ejected from the ride.

h) In order to prevent overrunning or running backward of the ride, all inclined or vertical appliances shall include a safety device that operates whenever the motive power is cut-off or fails and where the passengers conveyed possess kinetic or potential energy;

j) Add a primary and a secondary lock on the restraint system if not already present. The secondary lock should be independent of the primary lock and the restraint system must stay in the intended closed position in the event that either the primary or secondary lock fails. Riders should not be able to disengage either the primary lock or the secondary lock while the ride is in operation.

    Have the restraint system designed to sound engineering principles (e.g. fasteners used to secure the restraint bars and locking devices must be prevented from unintended loosening when the restraint system is being engaged or disengaged);

k) Every amusement ride operator/attendant is responsible for on-the-job safety. They are responsible for their own safety as well as the safety of other employees and that of the general public. Here are some basic rules for a safe work place that amusement ride operators/attendants should follow:
    1) Knowing and obeying all safety rules and procedures;
    2) Keep surroundings neat, clean, and free of hazards;
    3) Reporting hazardous situations that might result in an accident;
    4) Verifying the inspection checklists prior to operating the ride;
    5) Development of safe work habits and participate in safety training;
    6) Anything that can cause someone:
        i) To trip;
        ii) To bump their head;
        iii) Get asplinter;
        iv) To fall;
        v) Acute.

m) It is especially important to reach out to the parents of young children and to enlist their help and support in promoting safe riding practices enforcing all safety instructions;

n) Beware of all unsafe conditions that could cause trips or falls on the ride platform or steps and cause injury;

p) Ensuring that seat belts or safety restraints are fastened and locked in place before the ride starts;

q) Always careful not to close the door or restraint on any part of the rider’s body while the riders are getting on or off of the ride;

r) Any suspicion that a rider is under the influence of alcohol or drugs, should not be allowed them;

s) Be sure to alert pregnant women and people with heart conditions to possible risks involved in using the ride;

t) Remind riders to keep hands, arms, legs, and feet inside the ride at all times;

u) Remind riders to remain seated until the ride comes to a complete stop.

7 SAFETY CONSIDERATIONS

a) The use of amusement rides is recommended only for those who are feeling well.

b) The amount of time that passengers are held in an upside-down position should be limited.

c) Accelerations acting on passengers when using rides should be limited to a tolerable level. For guidance, IS 15475 (Part 3) may be seen.
d) If there are any problems with a rider or parent because of ride restrictions or behavior, amusement ride operators/attendants should not operate the ride. They should stop the ride if in motion and only resume operation after the problem has been settled.
e) Amusement ride operators/attendants should always report all safety-related matters to their immediate supervisor, the insurance company, and local safety authorities. They should also update the ride manufacturer and consult with them.
f) Amusement ride operators/attendants should never leave the ride while it is operating.
g) Amusement ride operators/attendants should watch the ride and riders at all times while it is operating.
h) Remembering and following these rules while operating amusement rides will significantly increase the chances of a safe and enjoyable time for everyone, riders and operators/attendants alike while lessening the prospect of stricter insurance terms and licensing requirements for the amusement ride hirers/operators.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Continuous Bulk Conveying, Elevating, Hoisting Aerial Ropeways and Related Equipment Sectional Committee, MED 06

Organization(s)	*Representative(s)*
RITES Limited, Gurugram	Shri Sandeep Mehra (***Chairman***)
CSIR — Central Institute for Mining and Fuel Research, Dhanbad	Shri Debashish Basak Shri Girendra M. Prasad (*Alternate*)
Conveyor and Ropeway Services Private Limited, Kolkata	Shri S. Shekhar Chkravarty Shri Kamal Kumar Bose (*Alternate*)
Desein Private Limited, New Delhi	Shri H. K. Gupta Shri Arvinder Singh (*Alternate*)
Directorate General Factory Advice Service and Labour Institutes, Mumbai	Shri G. P. Nijalingappa Shri H M Bhandari (*Alternate*)
Directorate General of Mines Safety, Dhanba	Shri D. B. Nayak Shri Vijay Yadaorao Barapatre (*Alternate*)
Durgapur Steel Plant, Sail Durgapur	Shri Sanjay Kumar Shri Deepak Biswal (*Alternate*)
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Indian Association of Amusement Parks and Industries, Mumbai	Shri Pradeep Sharma Shri Anil Padwal (*Alternate*)
Lepton Projects Private Limited, Ghaziabad	Shri Sanjay Kumar Shri Piyush Rathi (*Alternate*)
MECON Limited, Ranchi	Shri Sanjoy Bhattachar Shri Amit Pal (*Alternate*)
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Organization(s)	*Representative(s)*
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Project and Development India Limited, Noida	SHRI NARENDRA SINGH
RITES Limited, Gurugram	SHRI DINESH KUMAR
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TRF Limited (A Tata Enterprise), Jamshedpur	SHRI N. K. SINGH SHRI SUBHASH SHARMA (*Alternate*)
Tata Consulting Engineers Limited, Navi Mumbai	SHRI SUJOY MAITI SHRI SHIREESH S. SWAMI (*Alternate*)
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Usha Martin Limited, Ranchi	SHRI SUBRATA DUTTA SHRI SANDEEP JAISWAL (*Alternate*)
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SHRI AMAN DHANAWAT
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This Indian Standard has been developed from Doc No.: MED 06 (18110).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi